DOCUMENT RESUME

ED 232 945 SC 014 921

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TITLE A Methodology for the Study of Children's Environmental Knowledge in Other Cultures.
SPONS AGENCY American Association of Univ. Women, Washington, D.C.; National Science Foundation, Washington, D.C.
PUB DATE Apr 83
NOTE 11p.; Paper presented at the Annual Meeting of the Association of American Geographers (Denver, CO, April 1983).
AVAILABLE FROM Clark University, Graduate School of Geography, Worcester, MA 01610 ($2.00 postage and handling).
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Anthropological Linguistics; Children; Cultural Context; Cultural Interrelationships; *Educational Anthropology; *Ethnography; *Nonformal Education; Non Western Civilization; *Research Methodology; Rural Environment; Social Characteristics; Social Science Research; Sociocultural Patterns
IDENTIFIERS Sudan

ABSTRACT

An eclectic, ethnographic methodology is presented for studying the content and acquisition of children's environmental learning, knowledge, and interaction in a transitional economy in rural Sudan. Drawing on methods of geography, linguistics, and anthropology, the paper attempts to provide a valid alternative to most of the methods used in research on environmental cognition and behavior. It is especially appropriate for work undertaken in non-Western settings. Two methodological issues addressed are that researchers need to be aware that biases and values affect the research process and that methods appropriate to study in one culture are not necessarily appropriate to study in another. The study focuses on a sample population of seventeen 10-year-olds from a village of 350 households in central Sudan. The major portion of the paper emphasizes the researcher's methodology including (1) the combination of random and directed observations, providing a complete picture of the activities of the sample population; (2) verbal methods, including ethno-semantic interviews, providing information on the content and origins of children's environmental knowledge; (3) demonstrative methods, including child-led walks, landscape modeling, and geo-dramas; and (4) "oral-geographies," conducted with parents and grandparents of children, to discover the environmental goals for their children as well as their own childhood environmental interactions. (LH)

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A METHODOLOGY FOR THE STUDY OF CHILDREN'S ENVIRONMENTAL KNOWLEDGE IN OTHER CULTURES

by
Cindi Katz

Paper presented at the Annual Meeting of the Association of American Geographers, Denver. CO, April, 1983).

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A METHODOLOGY FOR THE STUDY OF CHILDREN'S ENVIRONMENTAL KNOWLEDGE IN OTHER CULTURES*

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INTRODUCTION

This paper presents a methodology which I used to study the content and acquisition of children's environmental knowledge as central to the social reproduction of a rural economy. My approach was forged drawing on methods of geography, linguistics and anthropology to provide information on (1) how children learn to interact productively with their environment, (2) the nature of their interactions and (3) their knowledge of environmental processes and resources. In this paper I will describe the methodology adopted including participant observation, ethnosemantic interviews, child-led walks, environmental modeling and "geo-dramas", and discuss its use amongst Sudanese children with reference to general questions raised by studies of environmental cognition in other cultures.

Knowledge is a cultural phenomenon. As a body of structured concepts shared within a social matrix, environmental knowledge is inseparable from the labor process and its underlying relations of production. This definition suggests that environmental knowledge and behavior are best studied in relation to a clearly delineated social context.

A socially grounded approach to the study of environmental knowledge carries two major methodological implications. First, methodology is not neutral. That is, the choice of method can determine the form and content of findings. Second, if each research endeavor is grounded in a specific social context, it suggests that the methods appropriate to study in one culture are not necessarily appropriate to study in another.

METHODOLOGICAL CONTEXT

Before describing the methods used in my study of children's environmental learning, knowledge and interactions in rural Sudan, I will expand briefly on these two issues and indicate how the approach I developed is integrated with these larger methodological questions.

First, it is important to remember that like theory, methodology is not neutral or value-free. It is developed and applied within a specific social and historical context. Simply put, the choice of method will inform the results of a study. Moreover, while it is often recognized that any methodology is only as good as the person carrying it out, it is less often the case that a researcher considers how her/his biases and values affect the research process.

*This paper was adapted slightly from a paper presented at the 1983 Annual Meetings of the Association of American Geographers, Denver, CO. I gratefully acknowledge the support of the National Science Foundation and the American Association of University Women in carrying out the research upon which this paper is based.

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A researcher, particularly working in other-cultural settings, does well to recognize, if not explicitly state, his/her values and the biases inherent in the research process.

Second, if a research effort is grounded in a specific social context and environmental knowledge is particular to that context, it suggests that the methods appropriate to the study of one culture may not be valid in another culture-setting. These implications call into question most of the methods adopted from cross-cultural psychology for use in environmental perception studies. Moreover, for comparative studies of environmental knowledge, they suggest that rather than adopting a strategy in which a common set of methods is used across cultures, it may be more useful and valid to compare data from separate inquiries which have been collected in a rigorous and culturally specific manner.

To illustrate my point here, I point out for example, that testing knowledge on the basis of externally imposed categories will provide very different information than eliciting knowledge on the basis of internal conceptual categories. It is important to make this distinction methodologically because many studies of environmental knowledge or cognition explicitly recognize the social and historical context of knowledge, but nevertheless inform their work with the use of tests and other methods which rely on external criteria.

In the context of these broad considerations, the methodology which I present here is of significance for four reasons:

First, it is a methodology for the study of children's environmental learning, knowledge and interactions. Its focus is, therefore, both knowledge and behavior. However, I see knowledge and behavior as integrally related but separate entities. That is, while I agree that the analytical distinction between culture as knowledge and culture as behavior is a useful one, I think it is a false and potentially troublesome dichotomy. Following the anthropologist James Spradley, I define culture as a system of meaningful symbols. Using this definition, culture can be seen as the acquired knowledge that people use to interpret experience and generate social behavior. My methodology, then, was one designed to provide information on both knowledge and behavior.

Second, it is a methodology for the study of environmental cognition in <u>other-cultural settings</u>. For this I developed an essentially ethnographic approach which views both knowledge and behavior as cultural phenomena.

Third, the methodology is an eclectic one. That is, in order to counterbalance the weaknesses inherent in any single research method or type of approach, I used a branching sequence of interrelated methods in my study of children's environmental knowledge and interactions.

Finally, I did not presume a uniformity in the backgrounds of the study participants but rather built into my approach a means for an analysis of distinctions in results. I anticipated and found, for example, distinctions based on gender and the social position of participants' families, but I also discovered the significance of birth order on children's environmental knowledge and interactions.

Thus, in my study I tried to develop an approach that would be at once socially grounded/appropriate to the study of children/and valid in an other-cultural setting. I will turn now to a description of the study itself and a discussion of the particular methodology developed for the study of children's environmental learning, knowledge and interactions in a transitional economy in rural Sudan.

STUDY OF CHILDREN AND THE ENVIRONMENT

Environmental learning, particularly in agricultural economies such as those found in Sudan, is an essential aspect of socialization, and thus also of the social reproduction of these economies. As agricultural economies develop we may expect significant changes in the settings, activities and content of their members' socialization. In order to analyze the relation between the content and acquisition of environmental knowledge and social reproduction in this social context I sought information on the content of children's environmental knowledge as it is acquired and used in the activities of work, play and formal learning and in the settings of the household, peer group, and formal education. The work called for a set of complementary research strategies to provide information on children's behavior, the structure and content of their knowledge, and how these have changed over the last two generations.

Study Setting

Before discussing this methodology in depth, it may be helpful to describe briefly the social context of the work. The research took place in a village of almost 350 households along the Dinder River in the Blue Nile Province of central Sudan. I spent from December 1980 until October 1981 in the village living as part of an extended family of six households, studying environmental learning knowledge and interaction amongst a sample population of 10% of the village ten year olds, (a total of 17 boys and girls).

Until 1971 the village was characterized by the subsistence production of sorghum and sesame complemented by animal husbandry on a small scale. Since that time the village has been incorporated in a state-sponsored irrigation scheme geared to the commercial production of cotton and groundnuts. The changes brought about by the scheme have altered not only the nature of local agriculture, but the social relations of production associated with it as well. The theoretical goal of my research, then, was an analysis of environmental knowledge as an integral part of social reproduction in this changing production system.

The focus of my work was the environmental knowledge and interactions of a sample of children from the village. At the outset of the work, I conducted a village-wide census which elicited basic demographic and socio-economic information. On the basis of this census I selected the sample population of seventeen children.

Study Background: Previous Geographic Studies of Children

The antecedents of my approach are to be found in the work of the Place Perception Project at Clark University almost fifteen years ago. Most of this research was concerned with children's spatial learning and place perception. Studies by James Blaut and others of children's mental maps and understanding of maps and aerial photographs indicated that these skills are developed informally in children prior to the linguistic skills associated with formal education. In his work on place experience in a New England town, Roger Hart further pursued the study of children's geographic learning. Hart examined experiential learning, informal sources of geographic information and children's affective response to the environment. Finally, in a preliminary study amongst children on St. Vincent Island in the Caribbean, Ben Wisner extended the work of the Place Perception Project to children's learning of environmental processes and the human manipulation of these processes. Wisner relied primarily on observation and found children engaged in a wide variety of environmental manipulations. Moreover, he found an emphasis on environmental learning within the family.

Building on this early work and adapting some of its methodology, my research focused on children's learning and knowledge of (1) local resources, (2) environmental processes, and (3) how to interact productively with the local environment, for example the learning and knowledge of agricultural skills and animal husbandry practices.

Research Methods

A branching sequence of complementary methods was used to counterbalance the weaknesses inherent in any single research method. The approach included methods of observation, verbal techniques, methods which enabled the children to demonstrate their knowledge and interviewing and surveying strategies to establish the social and historical context of the work. The methods used to provide information specifically on children's environmental learning, knowledge, and interactions are described below.

Methods of Observation

Participant observation was important to the work. Participant observation of everyday behaviors is a standard technique of anthropology and well suited to work amongst children. I used observation in two ways during my year-long stay in the village. First, random observations for short durations were used to establish the general pattern of activities of children in the sample population. These observations were continued throughout the field period to ensure that the full range of children's work, play and formal learning activities was documented and that the activities characteristic of each season and village setting were included. Second, children's

specific work and play activities were observed repeatedly and at length. For example, I accompanied children for long days shepherding, fetching water or collecting firewood, and watched them engaged in dramatic play or in the rough and tumble of some of their games.

These experiences resulted in observations such as the following abridged selections from my field notes:

> On this particular morning Awatif* and three of her friends (all approximately ten years old) set off for the tulih (a stand of tulih, Acacia Seyal, trees) at 6:30 and arrive there about a half hour later. They bring along rags to roll on their heads to rest the wood upon as they carry it home, and rope to tie the wood together. Within the tulih area the girls collect branches and sticks usually from trees that have been felled for charcoal production. They make three separate trips to different parts of the site, each time collecting full armloads of sticks and branches. The girls worked swiftly and easily, this was obviously a familiar task to them. They brought their armloads to a central site after each foray. After the third trip each girl sorted her own wood, piling the sticks and branches neatly over the outstretched rope, and then in pairs rocking the wood back and forth with their feet to pack it tightly, they tied the wood into large but neat and manageable bundles. They rolled the rags and placed them on their heads and then lifted the wood bundles by putting their heads down on the bundles and straightening up with the wood on their heads. They walk straight and tall as they head back for the village.

> These boys play "tenancy" as well as "store" or "subsistence field" frequently. First they made the fields by raising squares of dirt and plowing them into rows with the miniature tractor they had just made from found objects. After the rows were complete they made teganet, the raised linear mounds running between groups of rows which control the flow of water from the canals to the crop rows. Following their completion the boys planted groundnuts by sticking date pits lengthwise into the rows. They store these hundreds of date pits behind a house near their play area. After the fields were planted in groundnuts, the boys watered them. They usually sprinkle sand on the fields to signify watering them, but today they had a small vial of water which only wet about a third of two rows. They are well aware that the water in the real tenancies comes from the canals and irrigation ditches and seem to employ this knowledge by watering only between the rows as if the water had flowed there from the canal. Next they began to weed the fields and thin the crops using miniature versions of the short handled hoes used in the local fields. They each made a hoe using thick grass stalks and small pieces of scrap metal broken into a wedge shape. The weeding completed, the boys harvest the groundnuts by picking the date pits and piling them in the center of the field. They fill tomato paste cans with the pits to represent the

*All names have been changed.

sacks filled with groundnuts at the end of the harvest. They cart their crop on the tractor to a storehouse in the village some distance from the fields.

We started getting ready to move on and as the shepherds and their flocks broke-up and went separate ways, the shepherds had a chance to show their stuff. We were parting ways with two to three others and all of the boys worked together to round-up and divide each flock. It is a wonderful and totally crazy thing to watch, each boy runs around yelping and whipping the animals in and out of place. The shepherds fly between the collective flock, each crying out his version of the unique calls made by shepherds to get the sheep and goats in with the right group and moving in the right direction. They move at lightening speed and the marvelous thing is how they know their own and each other's animals. I asked them about this later on and they said they know them by their faces and colors and because they have known each animal since it was born. The rapid-fire rounding-up of the flocks, and as it gathers, its division into individual flocks requires real teamwork. The boys work together and coordinate their movements and actions all the while shouting orders back and forth to catch that stray or push this one in the opposite direction. The whole process took about thirty to forty minutes and after we were again on the move towards another depression we joined up with a couple of other boys and their animals. We got to the next well watered depression not long after and the boys let the animal graze freely.

The combination of random and directed observations provided a complete picture of the activities of ten year olds in the village. Moreover, these observations often were documented on Super-8 sound film. My intention was to build a record of the children's activities both for later analysis and as a document.

While observation can tell us a good deal about behavior, it tells us little about the meaning of particular behaviors or interactions as they are experienced. Moreover, although observation was of enormous use in informing me of processes the children had mastered, and how these were learned, it was less directly useful in providing information on the content and organization of children's environmental knowledge. For this information, I used verbal and demonstrative methods.

Ethnosemantic Interviews

The verbal method upon which I relied most heavily was the ethnosemantic interview. The method, in my case directed at eliciting taxonomies of environmental phenomena, was pioneered by Harold Conklin and Charles Frake in the mid-1950s as a means to elicit the shared knowledge of a culture group as it exists for the members of that group. The technique involves conducting a series of open-ended interviews which are designed not only to enable the participant to express his/her knowledge, but to reveal the ways and rules by

which that knowledge is organized. This process is time consuming both because of the need for several interviews which can be quite lengthy and because each interview must be analyzed semantically before the next one is conducted. In my case, I conducted from two to six interviews each of which lasted between one and two hours with each of a sub-sample of five children. Each child produced a taxonomy of local plants and three of them also developed taxonomies of places in and around the village and the uses associated with them.

One child for example developed a taxonomy for "things that grow from seeds in the ground". The taxonomy included the categories of trees, grasses, vines and cultivated plants and was contrasted along dimensions that included whether or not they were planted, whether they blossomed or had ears, whether they were small or large, whether or not they had thorns, whether or not they were a food source, whether or not they were used as fodder, whether or not they were desireable in cultivated areas and whether or not they were used as fuel.

In framing the categories and explicitly stating the attributes of and hierarchical relationships between the terms of each taxonomy, the research participants expressed the content of their knowledge as they organized it and not as a structure which I might impose upon them. For these reasons, ethnosemantic interviews are preferable to general testing methods or standardized interviewing strategies for work in other cultures.

Demonstrative Methods

As a counterbalance to the ethnosemantic interview which relies heavily on verbal ability, I used three methods which encouraged the demonstration as well as verbal expression of environmental knowledge.

Child-Led Walks In the child-led walk, I asked each child to take me where s/he chose and to show me anything s/he considered important. The walks invariably led outside of the village limits into the scrub surrounding the village, the river bed bounding it, or to the nearby irrigation canals and fields. The walks were a fun opportunity for the children to demonstrate their extensive knowledge of the local environment. The children identified particular environmental features such as plants or soil types all along our route. I structured the situation as each walk progressed by asking the children to identify and explain any uses of every plant that we came upon.

All of the children were able to identify at least ten plants and give a range of appropriate uses for each one. Many of the children had an almost encyclopedic knowledge of local plants and resources. Not only did these children identify virtually every plant that we came across, but they were imaginative and extraordinarily thorough in setting forth the locally accepted uses of each one.

Landscape Modeling In order to elicit the children's knowledge of village geography and the human-environment interactions within it, I asked each child to model the village out of dirt, water, sticks,

thorns and grass on a 10' x 5' area. For many children this technique was an excellent opportunity to demonstrate their knowledge of physical features and processes. These children built houses, plowed fields, dug irrigation ditches and got the river to flow. Other children seemed baffled by the exercise and uncomfortable digging-in and manipulating the available media. The results then were tentative sketch maps in the dirt outlining a few houses and the major physical features of the village.

Geo-Dramas After the children deemed that their models were done, I asked them to use a set of miniature farm animals, trucks and people whom I had laboriously clothed in Sudanese style, to show me life in the village. Again, some children took to these "geo-dramas" with great enthusiasm, but a few seemed overwhelmed by the perfection of these foreign toys and were inhibited in manipulating them. As with the landscape modeling, I interjected questions as the children acted out the patterns of everyday life. For example, the children invariably put the animals in the truck to take them to market, and I would always ask which market they went to and what price they got for a sheep, goat or cow. In this way, I was able to gather significant information on their understanding of environmental processes and interactions, and only the setting sun or calls to come home could end the game.

As the observation of the boys playing "fields" might have indicated, the behaviors associated with both the landscape modeling and geo-dramas were not alien to these children. In addition to "fields" (subsistence and irrigated) the children play "store" and "house". In each they act out in miniature the roles and responsibilities associated with each context or setting. The fit between these customary play activities and landscape modeling and geo-dramas as research methods, not to mention the fun of them, no doubt contributed to the high quality of information they provided.

Means to Access Change

In addition to these methods focused on eliciting children's environmental knowledge and documenting their environmental interactions, I conducted "oral geographies" with many of the children's parents and grandparents to discover their environmental goals for their children as well as their own childhood environmental interactions and their assessments of how things have changed in this regard. In addition, I was able to hypothesize about the changes in environmental knowledge, learning patterns and activities taking place as a result of the ongoing socio-economic transition because the sample population was drawn from families with low, middle and high degrees of integration with the irrigation project and the cash economy it represents.

CONCLUSION

I present this approach as a valid alternative to most of the methods used in research on environmental cognition and behavior. Each of the methods, with the exception of participant observation,

undertakes to discover the content and rules for organizing the collective knowledge and information processing structures of a particular culture group, in this case ten year old children from a rural village of central Sudan. None of the methods impose or search for any predetermined cognitive categories. I argue that this approach is central to any work on environmental cognition, but especially so when this work is undertaken in non-western settings. Those methods which impose categories external to the participants such as the tests common in cross-cultural psychology, almost always show the non-western culture to be at a disadvantage This is not surprising since western standards are used to make the judgements. The methodology I adopted attempts to avoid this problem by eliciting information on what phenomena are significant for a culture group and the means they use to organize this information.